The Michigan Antique Radio Chronicle

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A QUARTERLY WRITTEN FORUM OF THE MICHIGAN ANTIQUE RADIO CLUB

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Learn how Art turns a mouse-infested junk chassis into this beautiful Fisher 800 in The Shop

THE MICHIGAN ANTIQUE RADIO CLUB

The Michigan Antique Radio Club was founded October 19, 1985 at the Dillon Inn in Lansing, Michigan. Present at this historical meeting to found MARC were Jim and Brenda Clark, Larry Anderson, Karl Rommel, Mike Male, Dick Perry and John Kent. The purpose of the organization is to preserve the history and enhance the knowledge of radio, television, and related disciplines, with special emphasis on contributions originating in the state of Michigan. Dues for membership in M.A.R.C. are $25.00 annually (US funds) and payable in January. Officers of M.A.R.C. welcome your membership, your questions and your personal contributions to enhance the service value, growth and activities of the organization. Terms of office for Board members expire concurrently with the summer EXTRAVAGANZA meet held in Kalamazoo, Michigan. Send Correspondence to MARC, 311 Wordsworth St., Ferndale, MI 48220. E-mail: president@michiganantiqueradio.org. **Visit our Web site at** www.michiganantiqueradio.org.

President: Jeff Lilly, 311 Wordsworth St., Ferndale, MI 48220, 248-602-7513, rackofhats@gmail.com

Vice President: Ian Shackleford, PO Box 359, Conway, MI 49722, 248-860-6634, ishack@sbcglobal.net

Treasurer: Mark Goodwin, 9225 Moon Rd., Saline, MI 48176, 734-944-0730, mrkgoodwin@comcast.net

Rec. Secretary: Sally Reinicke, 7458 St. Auburn, Bloomfield, MI 48301, 248-626-4895, sreinicke@comcast.net

Mem. Secretary : Angela Shackleford, PO Box 359, Conway, MI 49722, 248-417-3700, ashack@sbcglobal.net

Trustee: John Reinicke, 7458 St. Auburn, Bloomfield, MI 48301, 248-626-4895, jreinicke@comcast.net

Trustee: Mike Dale, 3464 Judd Rd., Milan, MI 48160, 734-439-0834, mdale8@peoplepc.com

Trustee: Nancy Colbert, 22400 Nowlin, Dearborn, MI 48124, 313-274-1948, njcolbert9@comcast.net

Trustee: Dan Gutowski, 9753 Easton Rd., Dexter, MI 48130, 734-433-1354, dg16ms26@msn.com

Trustee: Dick Jones, 7050 Talladay Road, Milan, MI 48160, 734-461-9766, dcjpjones@aol.com

Trustee: Bryan Wilemon, 9320 Quandt, Allen Park, MI 48101, 313-382-2147, abpushpull@att.net

Trustee: Mark Yamazaki, 43808 Frederickburg, Canton, MI 48188, 734-394-0072, myamzak@wowway.com

Trustee: Bob Dobush, 126 S Main, Wellington, OH 44090, 216-346-3908, bobtheatre@aol.com

Trustee: Mark Mokris, 2161 Orchard View, Ann Arbor, MI 48108, 248-763-0381, mark.mokris@gmail.com

Media Director: Mark Oppat, 253 Blanche St., Plymouth, MI 48170, 734-455-4169, moppat@comcast.net

Web Master: Leann Meixner, 253 Blanche St, Plymouth, MI 48170, 734-455-4169, bluesthecat@gmail.com

Chronicle Editor: Steve Enzer, 12740 Monroe Pike, Brooklyn, MI 49230, 517-592-2841, enzer@binsys.com

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The Michigan Antique Radio Club is willing to assist in the sale of estate collections of antique radios and other collectable electronic items. For information, please contact either Mark Oppat at 734-455-4169 or Jeff Lilly at 246-602-7513.

Perspectives

Extravaganza continues to evolve and change. Each time we run it, we learn a bit more about the nuts and bolts, about problems to be corrected, about what you, the attendees and volunteers and board members, want from it.

This time around, as always, we had our successes and failures. The auction was disappointing- not from any lack of effort by the folks putting it on, but because of a lack of items to sell. On the other hand, the silent auctions seemed to grow in popularity. As a board, do we move on this knowledge? What do we make of it? What to do with it?

The large console unit presented to Harry S Truman, despite being in rough shape, was the pick of the litter this time around- a historic and interesting piece with a great story, despite its sorry condition. It showed up the day of the auction and we sold it for a decent amount, but if only we'd known about it sooner! If only we had, say, a month to advertise it, to generate more interest, to maybe get some news coverage of it! How do we find people who have interesting items they might wish to auction?

On the other hand, the world record record-playing attempt was a lot of fun! We got sixteen record players playing "Hey Jude" all at once, and it was a wonderful cacophony. After "Hey Jude," we flipped them over and had a "Revolution." Smiles were everywhere. The video made it online. We'll have to do something similar next year. Any ideas?

The presentations were great! Thanks to our presenters- John Reinicke, Craig Cianciolo, and Mark Oppat for sharing their expertise and insight. What kinds of presentations do you want to see next year?

The President's Reception had some great talks by members. The key to this hobby is sharing our expertise and knowledge with one another. Do you have something you'd like to share?

Attendance wasn't up to our hopes, frankly... but from what I heard, sellers were more or less satisfied. I saw a lot of folks just visiting and spinning yarns, and there were a few new people who came through the doors- two father-son and one father-mother-daughter combo who were introduced to the hobby and went home with a few projects to work on. Hopefully their interest will blossom into the next generation. What are other ways we can encourage this?

Why am I asking so many questions? Because we need your ideas, suggestions, and answers. Communicating with us is easier than ever, thanks to the newly-redesigned website (www.thevee.org). We're on Facebook, too: www.facebook.com/michiganantiqueradio

You can also get in touch with us the classic way, by writing to us.

We also, as always, need people to volunteer to help us run these shows. If you are interested in helping, even if only for a couple of hours, please let us know.

We look forward to seeing you all on Saturday, January 26, 2019 for the Winter VEE!

Jeff

NOTES FROM THE SERVICE SHOP

No. 103

by John Reinicke

Restorations and Tubes

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A hint of cool air and fall was in the air as I drove to Centerburg. There were traces of colors on the trees and long shadows reached across the fields. Cornfields were drying and it would be only days before the fall harvest. I was enjoying the smell of fall and that inspired me to turn off the air conditioning and drive with the window down.

I arrived in Centerburg about an hour before Ken and Betty would be closing their shop for the day and expected a chance to visit before they closed for the night. When I arrived at the shop I was surprised to discover a flurry of activity. Ken and Betty were obviously directing a fairly sizable crowd, dressed for work with gloves and equipped with hand trucks and other mover's paraphilia. They were unloading two large trucks and transferring the loads into the building next to the antique shop. The load was a mixture of display shelving and the merchandise that was to occupy the shelves. Ken, tape measure in hand, was directing the erection of the shelving units. Betty was right behind directing the placement of the merchandise.

As one crew made its way to get the next load of shelving, Ken took a break and came over to greet me. "As you can see, we are kind of tied up. I expect we will be done with this round in a couple of hours. How about we get together at Mazza's for dinner around 7:30 or so?" I responded with a wide-eyed nod of my head - yes. I went back to my truck to retrieve my camping gear and retired to the old apartment above the shop to set up for the night. After a shower and a walk around the square I made my way to the restaurant.

Ken and Betty arrived just behind me. They too, had taken a shower and were in fresh clothes. We made our way to the table and settled in. Family gossip was discussed as I enjoyed a beer and they worked on a bottle of wine. It did not take me long to ask about all the activity they were supervising.

Betty had a bit of a self satisfied grin as she explained all of the 'goings on'. "I suppose you might say, we are victims of our own success." I responded with a puzzled look as she continued. "As you know, in the past few years we have stumbled into several really quite fortunate finds. As a result, we have acquired a bit of a reputation, not just with collectors and dealers, but also with a number of upscale interior decorators. Our repu-

tation got quite a boost from articles that appeared in a couple of glossy magazines. Of course this has been good for business and more than once, one of those reporters asked if we were planning to relocate to New York, Chicago, or Los Angles. We explained that with Internet sales, our location really didn't matter and we would much rather stay in Centerburg – thank you very much.

"Some enterprising travel agents in New York and Chicago happened to see the articles and decided it would be a great idea to make Centerburg a 'destination'. After all, we have a bunch of shops here in the downtown and our downtown was described as 'quaint' in the magazine spreads and they described the shops as 'boutiques'. Add to that the fact we are surrounded by rolling countryside and a strong Amish community, and the rest of the world suddenly appreciated what we knew all along – Centerburg is a great place to be.

"When the first two tour busses parked in the square, it was astounding how many shoppers poured out. All of the businesses in town were delighted at first and then we realized how unprepared we all were. Just about everyone had to add staff. For our part, we were lucky to get the building next door. As you recall, it had been a drugstore and they moved to the shopping center on the east side. With all of those tourists we decided that it would be great to have a lot of 'smalls' – items that can be easily carried. By having what we are calling 'the annex' we can keep the present space for our furniture and larger items and display the 'smalls' in the annex. In addition to the stuff we pick up at estate sales, garage sales, yard sales and the like, we have added decorative items made by local craftsmen. Our business plan is that the annex should produce at least a seasonal steady income rather than counting on the occasional windfall find."

Ken was nodding in agreement and added, "We figure we are about a week away from our grand opening and, not coincidently, will correspond to the arrival of the 'fall color' tour busses."

"That might explain all of the fresh paint and general refurbishment I saw as I walked around the square." I added.

Ken continued, "Yep, the tour bus trade has been good for everyone. Frank Clinton is even trying to figure out if there is some way to re-open the old opera house above the shops on the south side of the square. It is really nice but when they built it in the nineteenth century they didn't much worry about fire escapes and there is only one set of stairs. Frank is a clever guy and I have faith that he will get it worked out. When he does, it means we will have a venue for live theater for the first time in almost a century."

We spent the rest of the evening with a discussion of changes in business in general. By the time we finished dessert we all recognized we were tired and decided it was time for some shut-eye.

The next morning, we shared our usual carry in breakfast and Ken gave me a tour of the new shop. After the tour, I headed for Art's shop for our planned get together. As usual, I enjoyed the walk and as I entered the shop I could see Art filling his coffee cup. He turned at the sound of the bell on the door, grinned, waved me over and pointed to an empty cup. I grinned back, walked over to fill the cup, and joined him at his bench.

We shared family gossip and an exchange of grandkid photos on our phones. From that we drifted into reminiscing about changes in technology and repair techniques. We both laughed at the fact I commented that by the time I had become good at electronics, the

parts were so small I could no longer see them, even with my bifocals.

I had decided to ask about something I had noticed. "Art can I ask you a question?"

Art gave a bit of a bemused, "Of course."

"I have noticed that you have a bunch of test equipment on the shelf above your bench and a couple of items on your bench. So your multimeter, signal generators, scope, sweep generator and even your dot and bar generator are close at hand, but your tube tester is over there on a bottom shelf." I pointed to the shelf on the wall opposite from his bench. "It even looks to me like it might even have a thin layer of dust on it. That tells me you don't use it all that much and I just wondered why. After all, we both work on a lot of tube type equipment."

Art paused to gather his thoughts. "You are quite right, I don't make all that much use of it these days. I suppose that is even more interesting when I think back to the days when I worked for Clem. Back in the day the tube checker was prominently displayed in the showroom and we really did test a lot of tubes for our customers. Of course that did help with sales of tubes and back then tube sales were at a really good margin. In those days, all of those TV sets and radios had comparatively new capacitors, resistors and other chassis parts so replacing a tube really would usually fix the problem. Plus, in those days, a radio or TV might be on for a large block of time each day. In that sort of service, higher power tubes like horizontal and vertical output tubes and rectifiers would tend to fail in just a year or so. I can't remember how many tubes we changed, but it was a lot.

"These days, the stuff I encounter doesn't have all the hours of operation. Most likely it has been sitting on a shelf for decades and the under chassis parts have failed due to age. Capacitors have absorbed humidity from the air and have become leaky. Electrolytics have dried out and are either open or shorted. Even if they haven't dried out, they have lost their form and will short the first time full Voltage is applied. Carbon composition resistors and those old 'dog bone' resistors are notorious for shifting in value. Ah, but old tubes are vacuum sealed and for the most part are as good as they were the day the old set hit the shelf.

"Even back then, Gerry taught me to change tubes based on performance. When he was working on those two-way radios he would test for performance and as long as things were 'up to snuff' he would leave the tubes alone. Back then, a mobile radio would have close to 20 tubes. Gerry was always concerned about a call back because of how important a radio in a police car or fire engine can be. Plus, he figured that the call to fix the radio would be at 'oh dark thirty' and he would have to get out of bed. New tubes had an infant mortality rate of about two percent. If you replaced all of the tubes in, say, 5 radios that meant you were guaranteed two callbacks – in the middle of the night, of course. What Gerry discovered from his experience was that a tube with several hundred hours would be quite stable and unlikely to fail. Its performance would slowly deteriorate but it was not as likely to fail outright as a new tube. So Gerry would keep good records on his 'fleet' of mobile radios and would check them on a regular schedule for alignment, receiver sensitivity, transmitter power and deviation, and general voltages. Only when the set wasn't up to spec or a particular tube showed signs of distress such as a brown getter would he change tubes.

"I have decided that changing tubes based on performance is a fairly reasonable approach. So I only substitute a new tube if I confirm one is dead or the Volt-

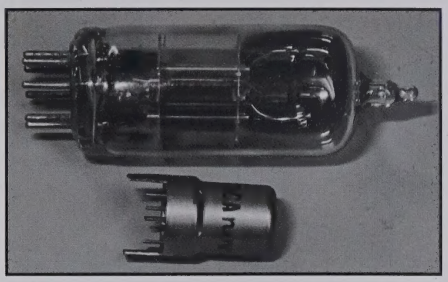
ages indicate poor performance. As a result, the tube checker pretty much stays on the shelf. I do use it from time to time but not very often.

"The other thing you have to keep in mind, unless you are using one of those elaborate laboratory curve tracers, is that a normal shop tube tester is a compromise instrument. For example, it really can't apply the drive that would properly exercise a high power tube. And then there are those tubes you should NEVER check in a bench tube tester."

I held up my hand. "Tubes you should NEVER test?"

Art nodded. "Yep, tubes you should never test. The first to come to mind are those space charge tubes that were used in car radios in the late 50's. The ones that only had 12 Volts on the plate like the 12BL6, 12AD6, 12AF6 or the 12DS7. With only 12 Volts on the plate, those car radios could use a new, at the time, power transistor for the output and didn't need a vibrator or power transformer. Of course in service those tubes would only see a maximum of 14 Volts or so and they were rated for a maximum of 16 Volts on the plate. Any bench tube tester will apply well over 100 Volts on the plate and the way the meter is shunted for calibration the current draw will be well in excess of the rating for those tubes. So if you try to test one, the tube likely won't survive the test, and if by some odd chance it did, you would have used over 90% of its life.

"The 'do not test' rule can also be extended to just about any tube with very small internal structure. This would include tubes designed for use as receiver RF amplifiers. Through the 50's a number of frame grid tubes were created primarily to improve the performance of television tuners. The frame grid allowed the internal spacing to be quite small and that reduced electron transit time for very good high frequency performance. These tubes were usually used in a cascode configuration with only 30 to 50 Volts on the plate. The result was very high gain at quite high frequencies with a good noise figure. Typical examples



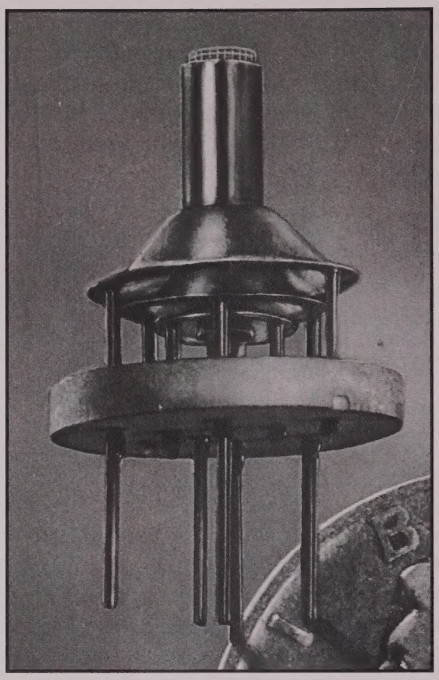
A Nuvistor (bottom) compared with a common miniature tube.

would include the 6DJ8 and 6BN4. Of course, the ultimate in tubes with very small 'innards' is the Nuvistor. The most commonly encountered Nuvistor is the 6CW4. Just about any newer tube checker will include a Nuvistor socket and a test chart for these tubes. What they don't mention is that the process of testing the tube will eat up 30% to 50% of the tube life.

"Quite a number of high quality FM tuners and receivers use these tubes and I never put the RF tubes in a tube checker. I test for sensitivity and if the receiver matches the rated specification, or can be brought into spec with alignment, I leave well enough alone. Not everyone has a microvolt calibrated signal generator and if I didn't I would rely on an on the air check. If the set gets a bunch of stations without much background noise, I would say it is working just fine."

I nodded in agreement and responded. "You know, it is interesting because I personally have never had the inclination to test RF tubes. In fact, in my encounters with tube type receivers, I can only think of, perhaps one, that had a bad RF tube.

"You mentioned the Nuvistor and I remember when they first came out.



The inside structure of a Nuvistor.

RCA invented a whole series of fabrication methods that would let them put together a brazed assembly that was cantilevered off the base and did not require the use of mica spacers. The base is ceramic and the envelope is steel and the whole thing was fabricated in vacuum at temperatures well above the melting point of glass. The result was a structure that was very rigid, free of microphonics, could take amazing amounts of vibration and shock and didn't require a getter. Nuvistors turned up in several high quality tuners and receivers and the result was performance that hasn't been topped to this day. In fact, I remember one Fisher tuner that had a cascode Nuvistor front end with a solid state IF. They used the Nuvistor because, at the time, it provided the quietest RF amplifier. These days, a designer could do better with a solid state front end, but economics rule and modern receivers usually don't even come close to those old tuners with the cascode front end."

Art laughed. "Rodger that! Of course you failed to mention that since those Nuvistors were barely larger than a pencil eraser and were made of high temperature stuff, in operation, they ran really, really, hot. I vividly remember the first time I put my finger on one and wound up with a very bothersome blister."

I chuckled and smiled back. (I wasn't about to mention that I had the same experience.) "So what is on your bench this morning? It looks like a vintage Fisher of some sort."

Art nodded. "Indeed it is. It is a vintage 1961 Fisher model 800. This was THE top of the Fisher line in '61. It was the first of a series of high power receivers with 30 Watts per channel. Both the AM and FM receivers were state of the art at the time and are still amazing today. This is a stereo receiver that just predates the introduction of FM stereo. At the time, broadcast stereo had to be simulcast. The right channel would be broadcast on an AM transmitter and the left on an FM transmitter. As a practical matter, this meant that a broadcaster in a particular market would have to have both AM and FM transmitters and would be willing to tie up both for stereo broadcasts. It really didn't happen in very many markets and I can remember it being used for special programs. Of course, multiplex stereo was in the works and stereo broadcasting began late in '62. By early '63 just about all major markets had at least one FM station broadcasting stereo.

"Of course, the Fisher engineers anticipated this and this receiver has provisions for the addition of an external stereo demodulator and even a position to select it from the front panel. In fact, this set has a very impressive total of 22 controls and features DC on all amplifier fila-

ments for very low noise operation. The AM section might be the best AM radio I have ever encountered and the FM is at least the equal of the best ever made. As you would expect, all of this performance and convenience came at a price and in 1961 this rig would set you back $429.00. I couldn't resist an Internet check and that is $3576.08 in today's money.

"It really is a good receiver and sounds great. Now that I said that, I have to mention that as project, this particular example may not have been exactly a rational choice for me to work on."

I gave Art a questioning look. "I know it is a desirable piece, so why do you say irrational?"

"Well!" Art responded with a fair Jack Benny. "I acquired this set at a radio auction a fair number of years ago. OK, well maybe a decade or two ago. When I got it I paid around 15 bucks and that was because of its condition. At the time, no one else wanted it. It had seen some, shall I say, unfortunate storage and clearly had mice nesting in it. There was extensive mouse urine rust on the chassis and the mice had chewed up the dial strings. It literally didn't smell good. To compound the problem, a previous owner had harvested the output tubes and 12AX7's. I could see it would be a lot of work and I just left it in a corner of the basement. This past winter, business got kind of slow in the shop, so I decided to see what I could do with it. When I took the bottom off, I could see that a previous mechanic had made some modifications to several circuits so I knew I would have to try to figure out what he got up to."

I could see Art was warming up to the story and I waved for him to continue.

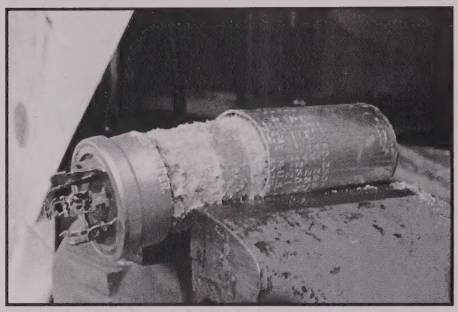
"My first step was to check the transformers to be sure all was OK there. I did the usual continuity test and checked for shorts with a megger. I removed all the tubes and disconnected the secondaries on the power transformer and energized it with a light bulb in series with the primary to be sure there were no turn to turn shorts. I checked the output transformers for ratio by applying 6 Volts AC on the speaker outputs and measured the Voltage on the plate leads. I checked the transformers first because I sure didn't want to go to a lot if trouble if the set had a bad transformer. Fortunately, the transformers were, and are, just fine.

"My next step was to remove the grime. I took off the front panel and all of the tuning hardware. I took the chassis out back to the driveway and took Navel Jelly to the rust. A stiff brush and an old toothbrush in combination with a solution of Mister Clean cleaned off the grime. I used my garden sprayer with clear water to rinse things off and followed the rinse with a hair dryer. I took advantage of having the tuning hardware off and cleaned and lubricated all those pulleys and those lovely flywheel-tuning shafts.

"Once I had the chassis clean, I proceeded with the electrical work. My first step was to remove the modifications. The previous mechanic had installed some RC networks in the audio section and judging by the values the intent was to cut highs and boost bass. They were not well done and were simply tacked on with great blobs of solder. The fact they were simply tacked on actually made remove easier and the excess solder was easy to suck up. Fortunately, the remaining components remained untouched.

"I knew I would have to replace the electrolytic capacitors. I did check out of curiosity, and all were either leaky enough to run quite hot with applied Voltage or were simply open. On something like this, I like to leave the old above chassis caps in place to retain the original look. I will tuck the new caps

under the chassis and leave the old units disconnected. In this case, however, it was clear there was not nearly sufficient room to do this. So, I gathered up my resolve and patience and set about carefully extracting the old caps. The first step was to clean excess solder from all the pins. With the cap on my vice, I used a hack-saw to carefully cut a groove all the way around about half an inch from the bottom. Wearing disposable gloves, I



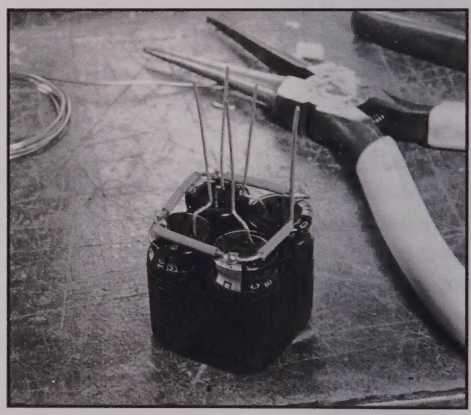
An electrolytic capacitor during disassembly.

pulled the top of the can off and then carefully pulled the innards away from the bottom. With the bottom free, I used soap and water and then clear water to clean off the residual goo. Fortunately, modern caps are much smaller and it was fairly straightforward to figure out how to tape up a bundle of radial leaded caps. I drilled small holes next to each pin in the bottom and routed the new lead through the hole. The common negative lead went through its own hole that I located next to a ground tab. I connected the common lead after the rebuilt cap was installed.

"Once I was satisfied with how I had the new caps in place, I carefully soldered them to the pins being sure to leave room for the original wire connections. For capacitors, I use the modern 105 degrees C, 2000-hour or longer caps. Since the originals were rated for 1000 hours at 85 degrees C, I figured the replacements should have a very long life indeed. Now I know that the caps would run cooler if I left them exposed to the air, but I wanted to retain the original look. To regain the look, I cleaned out the inside of the old top and reattached it using what I call real duct tape. Real duct tape is the stuff that is made of aluminum and is quite sturdy. The result is something you wouldn't notice unless you look closely.

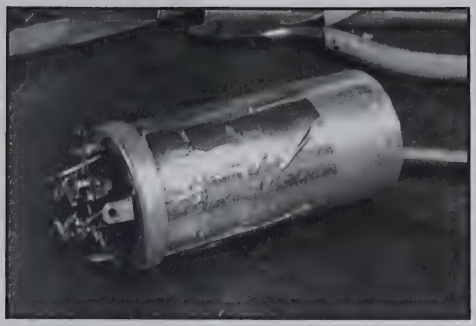
"As it turns out, the can electrolytic caps were easier than the dozen cathode by-pass caps. Those were all tucked down close to the chassis and took some time to unsolder, extract and replace.

"The next step involved the circuit that generates the DC for the amplifier filaments. For this there is a dedicated winding on the transformer that is connected to a full wave bridge rectifier. The original was a selenium affair that was feeble at best. I chose to replace it with a modern silicon bridge and this required a change. Selenium rectifiers have a fairly high forward resistance and I knew the output Voltage would be higher with the silicon rectifier. The original circuit used a pi network with a 15-Ohm drop-



New capacitors that will fit inside the case of the original electrolytic.

ping resistor and I tried a 30-Ohm resistor in its place. To my delight, this gave me the desired minus 22 Volts. This neg-



The rebuild electrolytic capacitor with the cover taped in place.

ative Voltage is also used for the output tube grid bias.

"I have learned the hard way that any time you work on a Fisher receiver of this vintage, replace the coupling capacitors that go to the grid of the output tubes. This applies to any of the high power tube type sets of the 60's and early 70's. At the time, they used Mylar caps and they will check quite well – no leakage at all. However, without warning, they will go from fine to dead short in an instant and put the output transformer, power transformer and output tube in great peril. I don't take a chance."

I nodded in agreement. "So what else may have presented a challenge?"

"If you look at that AM loop antenna, you will see a tag, right from the factory that says: 'Do not use as a handle.' Well, it was clear someone had used it, and it was quite broken. At least most of the broken bits were still there, no doubt helped by the fact some were hanging from broken wires. I thought about how to fix it for quite some time before I came up with a solution." Art paused for effect. "So my first step was to clean it up and then use fine sandpaper to rough up the back. On the front side, I carefully cut a strip of black gaffer's tape to hold all of the broken bits together in the proper place. With that done, I put the back firmly on my bench to keep it flat and pressed a roll of plumber's putty firmly onto the tape on the front. The putty would serve to keep things in alignment. I flipped it over, and on the backside I used epoxy to secure a sheet of fiberglass cloth that I had cut slightly oversize. I worked the epoxy thoroughly into the glass fiber. For this I used slow curing epoxy so I had plenty of time to get it just so. Once the epoxy set the next day I removed the putty and used a small circular saw on my Dremel tool to trim off the excess and leave a nice clean edge. I drilled two holes to line up with the holes in the mounting bracket and a couple of bolts and nylon washers replaced the original rivets quite satisfactorily.

"I took advantage of the front panel being off to string those two dial cords. You need two, of course, because the AM and FM tuning have to be separate. It is kind of a nice feature. For the dial string I used some woven Kevlar string I found at a Ham swap. Hams use it to sling lines

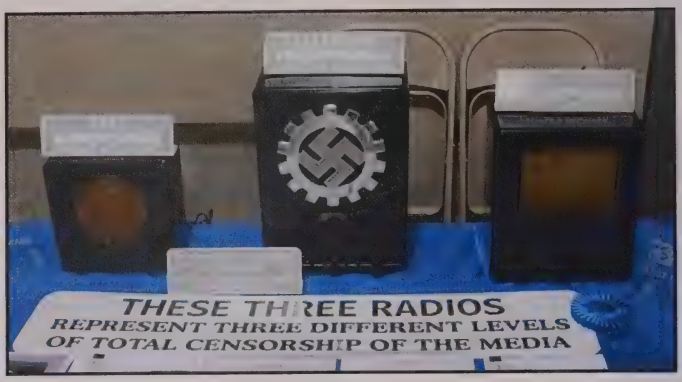
The AM antenna after someone ignored the "Do not use as handle" label.

over tree limbs to pull up antennas. In this application, it is just the right size, does not stretch and is unbelievably strong.

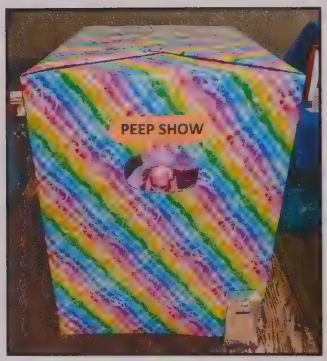
"In order to protect the dial glass, I checked alignment with the front panel off. To be sure the pointers were aligned and everything was tracking, I made a copy of the dial on my scanner. I converted the copy to a negative such that I could print a properly sized copy on my

(Continued on page 22)

EXTRAVAGANZA 2018



Best Restoration, Chairman's Award, and first place in the Open category went to these three rare German Volksempfanger radios from 1933 and 1938, owned by Robert Sands.

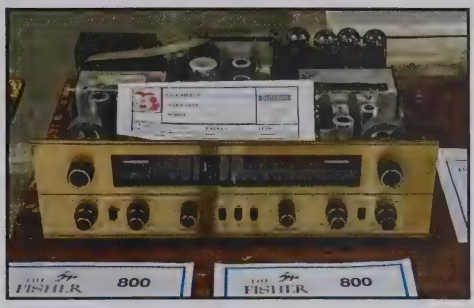


A model "Peep Show" made by Mindy Tai won second place in the open.

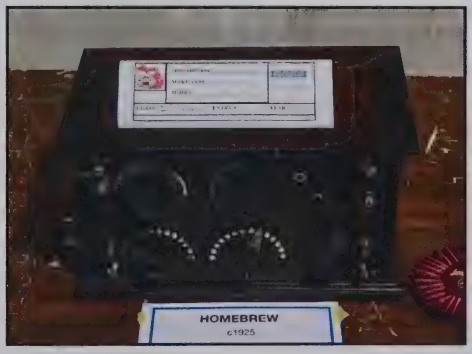
Third place in the open went to this unknown radio from the 1940s shown by Bob Dobush.

Ian Shackleford's 1958 H.H. Scott amplifier won second place in the Fisher/H.H. Scott category.

This nice vintage assembly of a Fisher FM-90X tuner, 80-C preamp, and 70-AZ power amp from about 1955 won first place in the Fisher/ H.H. Scott category for David Poland.

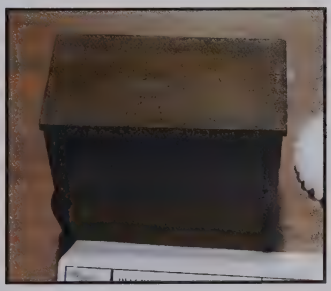


A Fisher 800 from 1961, shown by John Reinicke, won third place in the Fisher/H.H. Scott category.



John Reinicke's one-tube homebrew c1925 won second place in 1920s Innovations.

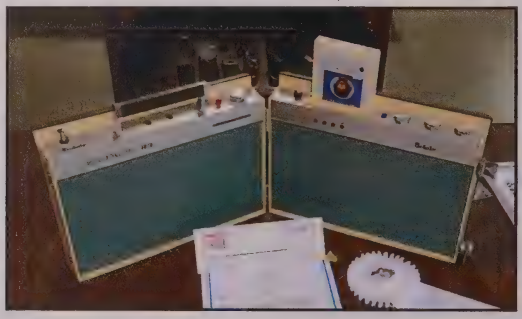
First place in the 1920s Innovations category went to Bowen Broock's Pocket Radio Auto Indicator 6R from about 1923.



A Donald Duncan 1920s crystal radio won third place in 1920s innovation. (The owner did not reveal his name.)

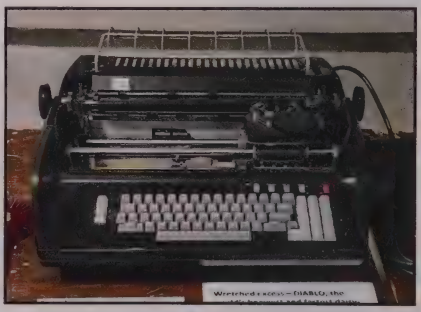
Bill Nolting entered a well-designed display of linear-tracking turntables, earning a first place in the End of the Line category. Turntables include a Rabco ST-4 (1973), Robco ST-7 (1978), and a Yamaha RX-3 (1982).

This Grunow console of unknown model and year won second in the End of the Line category for Jeff Lily.



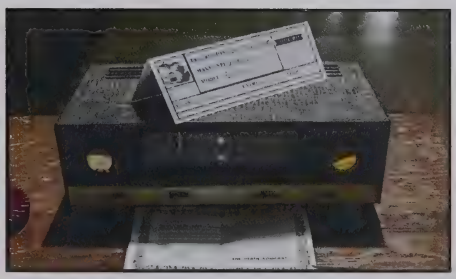
The End of the Line third place went to this 1969 Belair portable radio/8-track player (model CRH-401 shown by John Reinicke.

Geoffrey Bourne's 1935 Patterson PR-16C won first place in the Boat Anchors category.



A Diablo 1620 daisy-wheel printer and computer terminal from the late 70s won second place in the Boat Anchors for Bill Nolting.

This nice Heathkit AJ-53 AM tuner from 1967, owned by John Reinicke, won first place in the Kit Audio category.



Aaron Edick's 1960 Heathkit AJ-10 AM/FM tuner won second place in Kit Audio.

Some of the rare tubes Larry Anderson displayed for his presentation at the President's Reception.

Some examples of extraordinary Catalan color.

A Philco radio with 78 record player.

The Metal Radio and Safety

By Edward Dupart

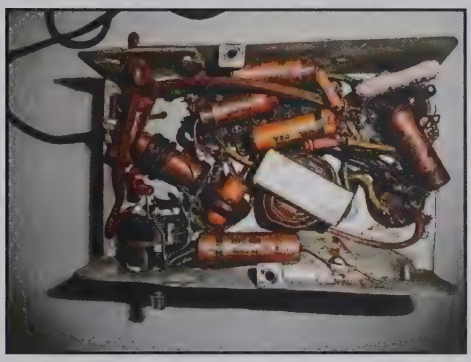
I recently acquired a nasty looking Arvin/Kent 402A radio of 1939-40 vintage that has only 3 tubes. Radios with few tubes and metal radios fascinate me so I couldn't resist picking this one up. How I restored this radio will come later; right now I want to discuss the safety aspect of the metal radio.

Imagine yourself with your prized little metal radio that fits so nicely in your kitchen that worked so nicely, but now it broke down. You take it to the local radio/TV repair shop and you hand it to the man behind the counter and he immediately pulls out his wire cutters and chops off the cord and hands it back to you. Are you stunned or what? You can't believe he actually did that! He explains that metal radios are shock hazards and they have killed people and that he refuses to fix them. Sadly, you take your little radio back home with you, not sure if you should take it to another repairman or buy a new radio, but not a metal one.

The Arvin/Kent as found

For years I lived in East Central Indiana teaching electronics, computers, technology and math and being involved in the electronics industry as a technician and sometimes as an advisor, but I also had an advisory board. The advisory board would keep me connected with the latest developments in electronics and what should be taught in the electronics program. One of my advisors was Harold from Knightstown, Indiana and he had been a radio/TV serviceman for years and he hated metal radios and he would chop off the cords of metal radios when someone brought one to him to fix, so the above story is a true one. No one really got mad at him or sued him; they simply took his word for it that they are dangerous little radios or took it to someone else to fix it.

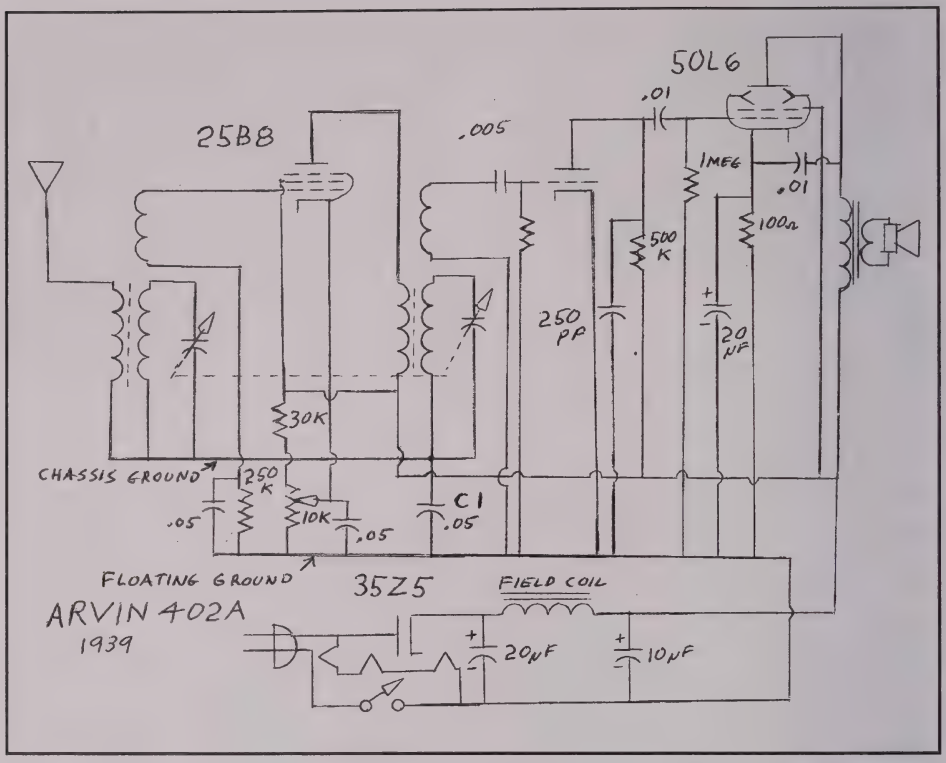
Now a little review of how the power comes into the house and how it makes these little radios dangerous. I will use 110 volts and 220 volts realizing different figures have been and are used, but 110 and 220 are easy numbers to work with and most people are familiar with them. 220 comes into the house with a middle leg or common ground that is literally connected to mother earth. So there are 110 volts between one leg, hot side, and ground and 110 volts between the other leg and mother earth. See the included diagram. This is where basements and concrete floors can become a real electrical hazard. If a metal lamp is wired where the hot side of the AC 110 volt line is connected to the metal lamp, then there is the potential for 110 volts to be between the outside metal of the lamp and the floor which is connected to mother earth. This means if someone is in his or her bare feet and touches the outside metal



of the lamp, then there is a good chance that 110 volts will pass from the floor through the person to the lamp. Water fixtures in bathrooms and kitchens make a good ground connection as well as water in a bathtub. So any electrical appliance that is wired or plugged in such way to make the outside cabinet or metal pieces hot with respect to ground are potential electrical hazards. I remember back in the 1980's a girl was electrocuted in Indianapolis when she was in the bathroom and touched a metal lamp and the faucet at the same time. Such a tragic ending to a young life. TV's with metal cabinets were a shock hazard and I would warn people who had one and were using it in a basement or a house with a concrete floor.

Arvin and other radio companies were aware of this hot chassis problem and took steps to minimize the shock hazard concerning their metal radios. They used a polarized cord on their radios where one prong is wider than the other prong so it would go in only one way in the wall outlet. Even back in the 1930's 2 prong outlets without the round third safety ground was polarized where one opening was wider than the other was. The wider side is the ground or neutral side and the shorter side is the hot side. Then the radio companies used a floating ground in their radios, which prevented the AC line from being directly connected to the metal cabinet. Some of you are probably thinking, wait a minute, the tuning capacitor or variable capacitor is mounted directly to the metal chassis, so how is it connected to ground or the negative side of the power supply? If you look carefully in the schematic you will see a .05 mfd

The restored set



capacitor (C1) going from the floating ground to the metal chassis. Reactance wise, it will look like a short to radio frequencies, but an open circuit to the 60 Hz line voltage/current. With the polarized plug and the floating ground, these radios were relatively safe. Not so with the TV's where I could measure 110 volts between the cabinet of a 1959 Muntz TV and ground. Reversing the plug cured the problem and I would instruct owners of metal TV's to reverse the plug if they could feel a little tingling, buzz or roughness when they touched the metal cabinet.

Another real shock hazard I ran into was at our house in Detroit where we could get really shocked bad if we touched the refrigerator and the garbage disposal switch plate at the same time. The switch plate was grounded and the refrigerator was hot. I proved it one day when I took a 110-volt bulb and connected it between the switch plate and the refrigerator handle and it lit up at normal brilliance. Reversing the refrigerator plug solved the problem.

Now you are probably wondering why all the concern over the metal radios and why did Harold hate them so? One reason may be about the capacitors. The capacitors back then were not of the high quality of today's capacitors and the paper capacitors of yesteryear tended to become leaky and behave like a resistor or actually short out. If the .05 mfd I mentioned earlier develops leakage or shorts out, then that would make the chassis/cabinet a potentially hot chassis/cabinet and thus a shock hazard. The next problem occurs when the power cord goes bad and gets replaced with a non-polarized plug. If the radio is plugged in wrong, you now will have a hot

chassis/cabinet. The next issue is where the building wiring is wrong and the ground side of the outlet is now the hot side and I've seen this before. I used to work on, do warranty work and install new microwave ovens. The first digital/computer-operated microwave ovens were very static and voltage sensitive and if the case was not grounded properly, the digital/computer board would go bad. One customer had problems with his microwave oven going bad frequently and what I discovered was that his outlets were wired backwards. Once the outlets were wired right, his oven problems disappeared. So, a metal cased radio could become hot if the building is not wired right. I tried to convince Harold that if the capacitor running from the chassis to the AC line is good and the radio has a polarized plug, then the radio is relatively safe. Nope, he wouldn't have any of that! He continued chopping the cords off. As a side note, I did fix a couple of his customer's metal radios and I made sure the capacitors were good and it had a polarized plug.

So what did I do to resurrect this little Arvin/Kent radio? Obviously I replaced all the capacitors and I made sure the .05 mfd capacitor that goes from the chassis to the floating ground was a high quality capacitor. This radio had been used in a kitchen and had a lot of grease accumulated on the insides of it. The outside of it was rusty with missing paint but not grease coated, but I figure the lady of the house kept it clean.

The first thing I did was take the chassis out of the cabinet and inspect it. The only capacitor that had been changed was the filter capacitor; all the others were original, including the resistors. The 35L6 took the place of the 50L6, which the radio originally came with and a dropping resistor was added to suck up the extra 15 volts when using the 35L6. More on the tube switch later. The speaker cone was loose and the variable capacitor was really full of grease and the chassis was coated with grease. 409 cleaned up the chassis nicely and it cleaned up the variable capacitor after I removed it and soaked in 409. I used a toothbrush, an old one, to clean between the plates and all over that variable capacitor. The toothbrush worked great on the chassis too. The variable capacitor was rinsed with plain water and left out in the sun to dry, after I shook it like a dog shakes itself after getting out of the lake and now it looks like new. The tubes checked good and with new capacitors I plugged it in and it didn't work. This is rare but a new .01 mfd ceramic capacitor was shorted. Ceramic capacitors are normally very rugged and reliable, so this surprised me. I checked the other new ceramic capacitors of the same brand and type and they all checked good. So I replaced the bad NOS capacitor and the radio works. The speaker was re-glued and the cone was positioned so the voice coil didn't rub and now it sounds pretty good.

A paint stripper was used to remove all the paint from outside the cabinet, but before that I removed the bevel with a thin scraper. Once the paint was gone, I took sandpaper and sanded all the rusty spots. A Dremmel tool with a wire brush worked great at getting rid of paint that remained in tight spots in the grill area and in creases. Be careful with the rotary wire brushes because at high speeds they like to throw out wire and can be a potential eye hazard, so I recommend wearing safety glasses when using rotary wire brushes. Paint thinner worked great at cleaning up the cabinet and made it ready for primer paint.

I stuffed an old plastic bag inside the cabinet to protect the paper work from paint. Then I set the small cabinet on top

of a paint can so I could reach all sides. I had a red filling primer. A filler primer is capable of filling in small dents and scratches, which this radio didn't have, just the natural little lines from being pressed out at the factory. I do a real thin coat at first what painters call a tack coat. This allows the next coat to really stick to the surface and is less prone to running. The primer dries fast so it didn't take long to build up a few coats and it looks pretty good red.

A decision had to be made on what color I was going to paint this radio. I have seen them done in wild candy apple colors, regular automotive colors, original colors and chrome plated. I chose to keep it original. After using steel wool on the yellowed cigarette stained paint I saw a bright ivory color that I couldn't find at Walmart, so I went to the auto store. There I found a GM color that was almost a perfect match so I bought it, not cheap, but it worked out very well. Using the same technique of starting off with a tack coat made the following coats go on better and I didn't have any runs. Having painted lots of cars helped with this project. The GM paint dried very fast so it didn't take long to apply about 5 coats and so now the cabinet really looks great. My wife had a double-backed tape and that's what I used to put the bezel back on with. I did use the paint stripper on the bezel to bring out the highlights like the numbers and lines, but left the rest of it dark. A red magic marker was used on the KENT letters, to replace the original red that was removed by the paint stripper. The cabinet now looks like new.

This is a TRF radio and is not a high performing radio. It picks up the local station very well and other regional stations come in pretty good at the upper end of the dial. Stations at the lower end of the dial didn't come in as well, but for three tubes, not bad. It's a cute little radio and I can see why it would have been popular in the kitchen and maybe the bedroom.

My research tells me this radio was built in 1939 to maybe 1940, so it is a pre-war radio. When I lived near New Castle, Indiana I would service radios and TV's and about anything else that didn't work and there were times I would work with Art, an old time radio TV repairman. He had been at it since about the beginning of radio or so it seemed to me. He was full of stories and told me about the tube shortages during WWII and how he got around the shortages to keep a radio going for his customer. Earlier I mentioned the 35L6 replacing the original 50L6 and now I want to explain a possible reason why. If a repairman during WWII didn't have any 50L6's, but had a lot of 35L6's then I could see why he replaced the 50L6 with the 35L6 and added the dropping resistor.

Editor's Note: After proofing this article, John Reinicke noted another significant safety consideration. If you look at the schematic on page 18, you will see that the power switch is on the side of the line connected to chassis ground. This was done to reduce AC hum, since the power switch is located in the volume control. The problem is that when the set it turned off, the hot side of the power is still connected, and has a path to ground via the tube filaments. Since the filament resistance is relatively low, the chassis is now "hot" if not properly isolated from circuit ground. Bottom line: be very careful will these sets, particularly if they have a metal case.

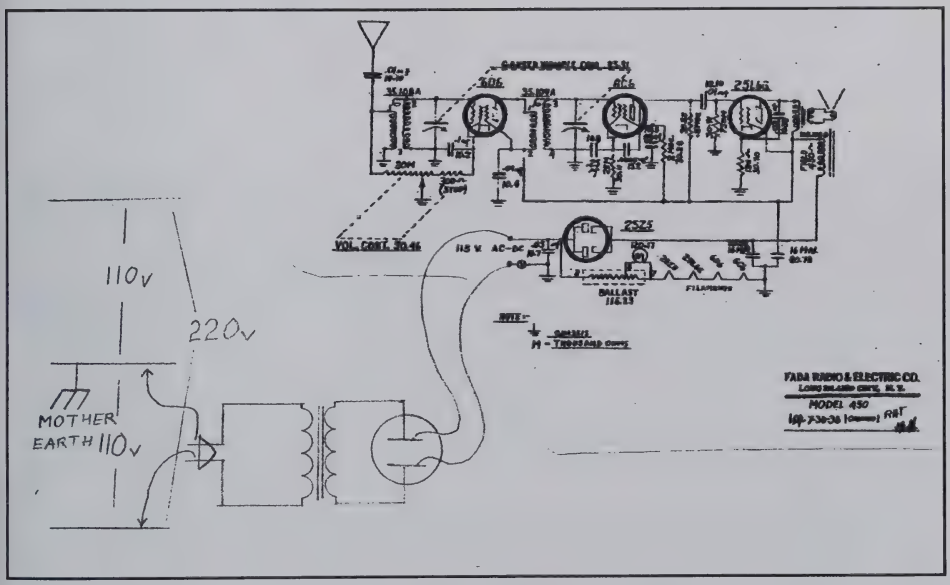
The Isolation Transformer

By Edward Dupart

For anyone who will be working on AC/DC equipment, especially radios, a must have item is an isolation transformer. The reason for this is the inherent shock hazard that comes with working on AC/DC equipment, which I have already discussed. Most test equipment is grounded and if the radio chassis is hot then sparks will fly when the test equipment ground lead is attached to the radio. I remember one technician decided not to use an isolation transformer and when he tried to attach the ground lead to the radio the sparks flew and the fuse blew. The look on his face was priceless.

A number of different types of isolation transformers are available, the one I use is a B&K TR-110 which has two non-isolated outlets and two isolated outlets and was/is a popular unit in shops and schools. My backup is a simple one-to-one transformer with one outlet. Isolation transformers can be found at radio/ham swap meets and on EBAY and they can be bought new.

How does an isolation transformer work? The transformer has two windings, a primary that is plugged into the wall outlet and the secondary where the radio is plugged in. There is no physical connection between the primary and the secondary and so there is no physical connection to the hot side or the neutral/ground side of the power line, hence, isolation. The enclosed diagram shows an isolation transformer hooked up to a 1938 Fada 450, a cute little TRF radio that works surprisingly well. One side of the AC cord goes directly to the metal chassis and the original cord was not polarized. This is not unusual when the cabinet is plastic and the Fada 450 used a Bakelite cabinet, but if you were to hook up test equipment to this cute little radio you would have a 50/50 chance of the chassis being hot. So using an isolation transformer with this radio eliminates a lot of headaches.



(Continued on page 24)

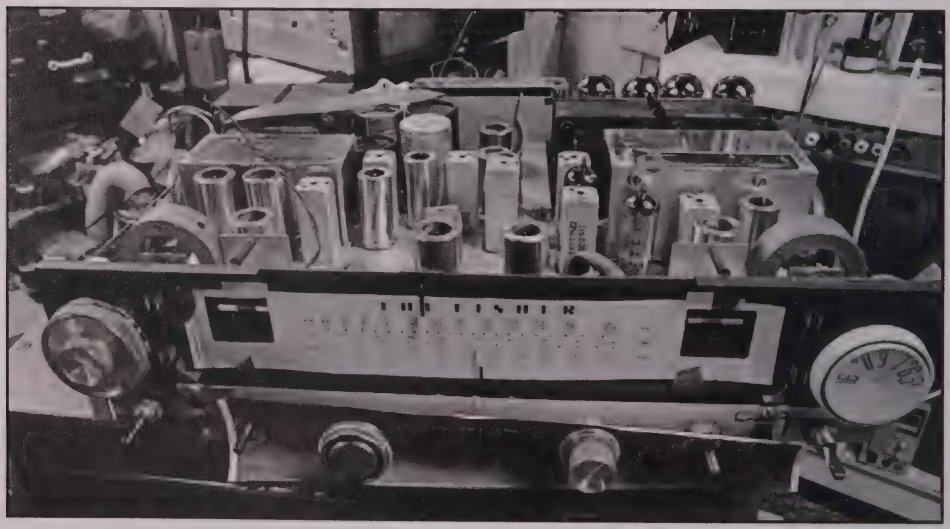
(The Shop, continued from page 11)

printer. (The dial has white lettering and my printer doesn't have white ink.) I taped the copy in place of the piece of glass. As it turns out, when I did the alignment I was thinking 'Why did I bother?' Fisher really did use good components and the alignment was dead on after only 57 years.

"For the missing tubes I used a set of J&J modern tubes. In testing I found these appear to work quite well and the receiver really does sound good. As I said, the AM receiver is probably the best I have ever encountered for receiver performance combined with audio quality. The FM receiver is as good as the best I have worked with. The FM does show a tiny bit of drift for the first 15 minutes but after that it is rock solid - not at all bad for a receiver that could sign up for AARP. The beauty of this receiver is that it is a 'daily driver'. If it were a museum quality sample with all original tubes you might feel bad about actually using it except for special occasions. Since the tubes are still available I don't have any qualms about using it."

I grinned in agreement. "You said the receivers are great. How does it sound?"

"Well I did test it and I found the J&J tubes may not be quite as good as the original. The harmonic distortion is about 0.8% at 30 Watts and to get it to 0.5% you have to drop to a bit under 28 Watts. I would have to suggest that anyone who claims they can hear that difference either is truly gifted or delusional. For the phono testing, I used a turntable that happened to have an Audio Technica cartridge. That I found sounded unusually bright. I actually though it sounded pretty good, but I decided to take a look at the schematic. For the magnetic phono input, this set uses a 100Kohm resistor. Modern cartridges, including the Audio Technica, typically call for 47Kohm load. Replacing the input resistor made the cartridge sound 'normal'. It dawned on me later that this phenomenon may have been what inspired the clunky modifications. I don't necessarily recommend making changes to original circuits, but



Almost done, the Fisher has a copy of the frequency dial taped to the front for an alignment check.

with a 'daily driver' I will occasionally try things."

I took a closer look at the receiver on the bench. "It looks pretty good. You must have done something more than you mentioned for the aesthetics."

"Yes I did, but not really all that much. After I cleaned the worst of the rust off the chassis, I did touch it up with some silver paint. I used deOxid on the phono jacks on the back and cleaned all the pots with alcohol followed by deOxid potentiometer treatment. The switches were also treated with deOxid. The front panel and knob 'brights' had pitting that I cleaned with good 'ol Brasso. The dial glass was really grimy and I cleaned that very carefully with Windex. I have learned to be very careful about the silk screening on dial glass and front panels."

Art connected the receiver to speakers and was only too happy to show me how many stations it would receive and how great it sounded. He left it playing as our session continued and we discussed our summer activities. We both had attended EXTRAVAGANZA and Radiofest.

Art paused and seemed to have an 'ah-ha' moment. He raised one finger as he snapped the rest of the right hand. "Oh yea, I did something new this summer."

"And that would be?" I responded.

"I took in the Midwest Audiofest this past July. It was on July 14th, the same Saturday as the second day of EXTRAVAGANZA. I admit, I snuck out on Friday and drove down to Dayton, Ohio. Audiofest is hosted by Partsexpress on their property in Springboro Ohio. Since they are in the business of selling a rather large range of audio equipment I suppose one would think they don't do this entirely out of the goodness of their heart. But, you know, it was really well attended. They set up tents and had a cookout. Of course they had a tent sale but there was a fairly sizable flea market as well. Lots of folks had audio gear to swap and I got a chance to run into a whole new bunch of 'geeks'. I found the speaker building contest to be really quite interesting. The winning entries were quite special and the categories were divided by the cost of the parts that went into the speakers. Wow, speakers no longer have to be an uninteresting box. One winning entry was a striking red and white painted pyramid. One was made of an intricate build up of blocks of various hardwoods. I wondered if the creator had experimented with legos to get the pattern. It was quite striking and had a backwards slant. This too, had no parallel lines and would be quite a fashion statement in your listening room. The unlimited winner was really impressive. Each speaker consisted of 24 - 2.5 inch drivers mounted vertically in a thin columnar sweeping 36 degree arc. They were each over 5 feet tall. Talk about a making an aesthetic statement.

"What I found interesting was how good all of them sounded. And, I must add, they all sounded different which I expect was to suit the taste of the creator.

"I am sorry to not hang around EXTRAVAGANZA, but I really enjoyed the Audiofest."

I did give Art a bit of a hard time, but agreed it sounded interesting. Our visit continued for the rest of the morning. I even helped with a couple of Art's customers. We both got a private chuckle out of the fact one of them brought in some tubes to test!

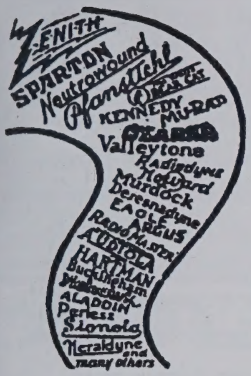
Isolation Transformer, continued from page 21)

Somebody out there is probably wondering how do I work on an AC/DC radio when I don't have an isolation transformer? Most technicians/engineers will say, "Don't work on it until you get an isolation transformer." If you absolutely have to work on the radio without an isolation transformer then measure the voltage or hook a 110-volt light bulb between the chassis of the radio and the ground of your test equipment. If the meter says zero volts and the bulb doesn't light, then it should be OK to work on the radio. If the AC/DC radio, or more commonly an AC/DC TV that has a voltage doubler circuit, then an isolation transformer is a necessity. Diodes in the voltage doubler circuit make such a nice popping noise and they smell so good when they go up in flames.

Radios and TV's with a power transformer may already be isolated, if the secondary is not connected to the primary in any way, shape or form. Again, use a meter or a 110-volt light bulb to make sure there is no voltage between the chassis of the radio or TV in question and the test equipment ground. So power transformer-powered radios and TV's may not need an isolation transformer, but again check for voltage between the chassis and test equipment ground. Also, noise-reducing capacitors that are commonly placed from the AC line to the chassis ground could be leaky or shorted and would destroy the natural isolation of the radio or TV's power transformer.

Not only does the isolation transformer protect your radio, TV and your test equipment, but it also protects you!

Back to Mayberry?



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Please note that ads for the Winter issue are due by November 17th.

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FOR SALE: PARTS! We have a full stock of radio supplies, including capacitors, tubes, knobs (including our two types of real wood repros!) , bulbs, tube shields, etc. Our two specialties: repro radio dials (we bought the former Clint Blais repro dial business in 2003, and they are still the best!) and we can duplicate or repair most old volume or tone controls. Phono needles, carts and wheels too. Email any wants or see our website at www.oldradioparts.net Over 30 years servicing radios here! Mark Oppat moppat@comcast.net 253 Blanche St, Plymouth, MI 48170 734-455-4169 11am-9pm most days.

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FOR SALE: – Repro Antique Radio Dial Covers – Mark Palmquist - Retro Radio Repair www.dialcover.com 5033 Arbor Ln, Lilburn, GA 30047 (770) 923-8929 jmpalm@mindspring.com.

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FINDER'S FEE: I am willing to pay a $100 finder's fee to the first person who can provide me the whereabouts of the Reuben Smith 5-tube TRF battery radio with a glass front panel (circa 1925) manufactured in Lansing, MI that I traded off to the late Oran Sauder of South Lyon, MI perhaps 25 or more years ago. Jim Clark, 517-648-2785 or jc072651@aol.com. Thank you.

FOR SALE: Over 50 radios FOR SALE. Sell one or all. Battery sets, Consoles, Table model wood and plastic, Transistors. Priced right. Also radio related misc. literature, test equipment and misc. ham radio accessories . Alan Reed, 2875 Geneva Hwy, Manitou Beach, MI 49253. 517-547-7470 evenings.

WANTED TO BUY: Your old capacitors, new or used (prefer with leads). All types: Wax, plastic, molded, striped, metal shell, disc, etc. These can be from your radio restorations, junk box, or vintage 1940-70s new old stock. Will pay shipping as well, or I can pick up at the winter meet in January. Dan Gutowski 734-718-7450 email: dg16ms26@msn.com.

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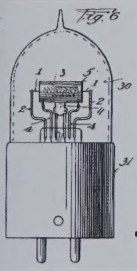

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If you have an idea please feel free to discuss it with me, either by phone or email.

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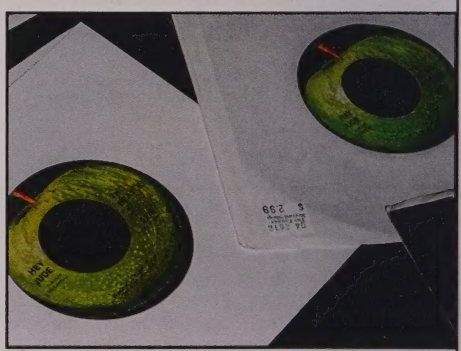
Well, THAT Happened...

By Mark Oppat

It was an idea that just popped into my head late one night. What could we do to draw attention to the VEE in Kzoo? Hmm... How about set a "Guinness World Record" for the most record players playing the same record? Why not... it seemed like an easy thing to do, fun, and there was no existing record near as I could find. I picked the Beatle's "Hey Jude" 45 as that record is 50 years old ... it came out late August of 1968. Plus it's a slow song and long. First, I had to find a lot of copies of that record. After some searching, found about 22 of them. Past MARC Prez John Reinicke had a rare UK pressing of it. Other MARC members had some too. What was going to happen? Well....

One local TV station showed up... was hoping for them to do a story before it happened but something is better than nothing. So, we got the record players all set up on tables in the main flea market room at the Expo Center, got a "slip sheet" and 45 adapter on each platter to make cueing easier, and quickly taught everyone how to cue their records. Then, we gave it a go ! UGH, way off ! Lets try that again.... well, better this time but still not great. It's a LOT harder to get them synched together than I imagined! I thought it would be like a chorus of folks singing... but didn't realize how close folks can sing together... after all, record players can't hear each other and don't seem to care... they will play your record at THEIR speed, thank you very much!

So, "ONE more time folks, with FEELING" is what I wanted to say... just like your old choir director would. Everyone recued.. and off we went. It was a cacophony of Paul McCartney singing and playing piano. Not really musical, but I did the best I could to keep them together using one player to synch the others to. There was some dancing, giggling and a lot of "La-la-la lalalalaaaa" singing over the ending chorus that runs for 3 minutes or so. Smiles and joy.



Turns out we had 16 players. I will send that to Guinness and see if they will list us. I could use more documentation, so if you were there, and have any video, or were one of the players, get in touch please.

No matter, it was FUN and in the end, that's what MARC events are all about. Hope to see you January 26 in Farmington Hills for the Winter Vintage Electronics Expo !